# Chapter 1
# EXECUTIVE SUMMARY

The City of Menlo Park (City) contracted with Metcalf & Eddy (M&E) to evaluate, model, and prepare a report for their water distribution system. This report presents the findings of the evaluation and computer modeling and recommends three preliminary design projects to be considered by the City. Also included in this report are the recommendations for the long-term maintenance needs for the City. The recommendations are the result of a review of pipeline repair records and inspection of above grade mechanical and electrical equipment.

The computer modeling of the water system was completed using H2Onet as the hydraulic model. This model was selected after the evaluation of ten similar hydraulic models.

The water demands of the system were input to the model by using individual account data from 1997. All the actual demands were used directly in the model except for the single residence areas. Demands were estimated for these areas by multiplying the number of residences by a unit water use factor determined from sample data.

Originally, the water demands were input to the model using account data from three years, 1995, 1996, and 1997. When the data was found to be flawed, model water demands were changed to use data for only 1997 because it was the only data available.

A water balance has been completed for the same three years mentioned above. Since the demand data was flawed, the water balance between the amount billed versus amount purchased was significantly different (15 to 20%). Using corrected summary data for the same three years, the new water balance shows approximately 4% difference between the billed and purchased water for the City. This 4% factor was added to the actual demand data that could not be accounted for directly in the model (1.5%), such as portable water meters and irrigation users with no address. A 5.5% factor was used in the modeling to estimate and distribute the unaccounted for water.

After growth projections and peaking factors were estimated and fire flows assumed for the City, the model was calibrated. Estimated storage requirements for future demands and fire protection requirements are presented in Table 1-1.

The future maximum day demand storage is estimated at 7.4 million gallons (MG). The worst-case condition for future demand storage, which includes maximum day plus fire flow in Zone 3, is 8.8 MG.

**Table 1-1**
**Summary of Future Storage Requirements**
**(gallons)**

| | Zones 1,4,5 | Zone 2 | Zone 3 | Totals All Zones |
|---|---|---|---|---|
| Fire Protection | 1,200,000 | 540,000 | 1,320,000 | N/A |
| Emergency Reserve (24 hrs) @ Max Day | 3,356,305 | 1,312,812 | 2,751,946 | 7,421,064 |
| Total Storage Required | 4,556,305 | 1,852,812 | 4,071,946 | N/A |
| | | | | |
| Max Storage Required for All Zones* | 8,741,064 | | | |
| * Equals Zone 3 Fire plus Emergency Reserve for a maximum day for all zones. | | | | |

Modeling results for average day, peak hour, and maximum day plus fire flows are presented in Chapter 8. Zones 1, 2, 4, and 5 cannot meet fire flow requirements if one or more sources of water are out of service. A list of ten improvements is suggested, as shown in Table 1-2, and all ten improvements have been modeled.

**Table 1-2**
**Suggested Improvements for Distribution System**

| Improvement No. | Description |
|---|---|
| 1 | A 6.5 million-gallon (MG) reservoir and pump station in Zones 1, 4 or 5. |
| 2 | A 6.5 million-gallon (MG) reservoir and pump station in Zone 2. |
| 3 | New pipeline supplying water from Zone 3 to Zones 1, 4, and 5. |
| 4 | New pipeline and pump station supplying water from Zones 1, 4 and 5 to Zone 3. |
| 5 | New booster pump at CWC connection in Zone 3 at Avy Avenue. |
| 6 | New parallel pipe from Palo Alto connection to Bay Division Pipeline Meter B4 connection. (ECR) |
| 7 | New meter and pump station along Sharon Park Drive in Zone 3. |
| 8 | Additional pump in existing Sharon Heights Pump Station. |
| 9 | Different inlet and outlet structures and pipelines to Sand Hill Reservoirs. |
| 10 | Combination of Improvements 3 or 4 and new reservoir at Sand Hill Reservoirs site. |

M&E has evaluated and recommended three improvements for implementation by the City. The three projects chosen for preliminary design, shown in Table 1-3, were selected to give the City of Menlo Park the most flexibility and redundancy during emergency situations, while meeting state Title 22 emergency storage requirements and being economically feasible.

**Table 1-3**
**Suggested Preliminary Design Projects**

| Project No. | Description |
|---|---|
| 1A | A 6.5 MG reservoir and pump station at VA Hospital to serve Zones 1, 2, 4 or 5. |
| 1B | A 2.0 MG reservoir and pump station at VA Hospital to serve Zones 1, 2, 4 or 5. |
| 1AA | A 6.5 MG reservoir and pump station at Burgess Park to serve Zones 1, 2, 4 or 5. |
| 1BB | A 2.0 MG reservoir and pump station at Burgess Park to serve Zones 1, 2, 4 or 5. |
| 2 | Different inlet and outlet structures and pipelines to Sand Hill Reservoirs. |
| 3 | Combination of Improvements 3 or 4, Improvement 6, and new 3.3 MG reservoir at Sand Hill Reservoirs site. |

The California Code of Regulations, Title 22, specifies needed storage volume for a water system. Section 64564, Procedures for Determining Needed Source Capacity and Needed Storage Volume, states "Unless the Department's written approval is obtained, the needed source capacity shall not be less than the maximum day demand." This statement has been interpreted to be the presiding regulatory requirement for the required storage volume in this report. However, in a letter from the Department of Health Services, dated April 2, 1997, it was stated that zones or service areas only required an eight-hour maximum day supply. Since the cited regulations conflict, each of the applicable preliminary design projects listed below in response to the maximum day demand storage requirement also includes an alternative that assumes the required storage is only eight hours.

The worst-case condition anticipated for these pre-design projects was having all connections to the San Francisco Water District (SFWD) out of service and having a fire occur in any one of the zones. Such a situation could occur after an earthquake or if the Sunol Valley Filtration Plant of the SFWD is out of service. In this scenario, Zone 3 would provide adequate storage capacity for a maximum day supply and a fire in Zone 3. However, Zones 1, 2, 4, and 5 do not have any storage capacity at present. If the Hetch Hetchy Water System of the SFWD is out of service for even a short period of time, Zones 1, 2, 4 and 5 will have a significant water supply problem to address emergencies.

Two solutions have been proposed, evaluated and modeled as preliminary design projects. The modeling results indicate that both solutions are feasible with some modifications to the existing water system as discussed below.

The first preliminary design project is to construct a reservoir and pump station in Zones 1, 2, 4, or 5 to provide fire protection requirements and emergency storage requirements. This project was modeled with two alternate reservoir locations; one alternative was a new reservoir in Zone 1 at the VA hospital site (Project 1A). The second alternative location was a reservoir at Burgess Park (Project 1AA). For each reservoir location, two different sized reservoirs were evaluated. A 6.5 MG reservoir (Projects 1A and 1AA) is required to meet fire protection requirements and emergency storage for 24 hours for Zones 1, 4 and 5 and Zone 2. Assuming only the 8-hour maximum day storage alternative (no fire flow included), the required reservoir volume is 2.0 MG (Projects 1B and 1BB).

The second pre-design project (Project 2) creates different inlet and outlet pipelines for the two existing Sand Hill Reservoirs. Currently, there is one 16-inch pipeline carrying water to and from the reservoirs, as needed. The goal of this project is to increase the redundancy of Zone 3 in case of emergencies.

The third preliminary design project (Project 3) is to construct adequate storage in Zone 3 to supply all of the zones during an emergency. Since the existing two reservoirs in Zone 3 provide only 5.5 MG of storage, a third 3.3 MG reservoir is necessary. In addition to constructing a new reservoir, major improvements needed for this pre-design project include the following:

1) Construct a separate inlet/outlet structure for the existing two Sand Hill Reservoirs in Zone 3.

2) Construct a 24-inch pipeline, approximately 14,100 feet, from Zone 3 to Zones 1, 4 and 5.

3) Construct a 20-inch pipeline, approximately 15,000 feet, from the proposed 24-inch pipeline connection in Zone 4 to the Bay Division Pipelines Nos. 1 and 2 connection (at Meter B4).

Once the two proposed pipelines are complete, Zone 3 can supply all the required fire protection requirements and emergency storage for Zones 1, 2, 4, and 5 via the new pipelines. If this proposed reservoir is constructed next to the two existing reservoirs (at elevation 486 feet), all of the stored water will be at the highest elevation in the system and therefore will require no additional pumping to reach any of the zones.

The order-of-magnitude capital cost estimates for each of the pre-design projects are summarized in Table 1-4. For Pre-Design Project 1, all alternatives include costs for a

prestressed underground tank with tennis courts on top of the tank and a pump station with an upgraded structure from the basic prefabricated structure.

**Table 1-4**
**Summary of Capital Cost Estimates for the Preliminary Design Projects**
**(Not including Real Estate Costs or Operation and Maintenance)**

| Project | Total Cost |
|---|---|
| Pre-Design Project No. 1A – 6.5 MG reservoir at VA Hospital site | $10,520,000 |
| Pre-Design Project No. 1B – 2.0 MG reservoir at VA Hospital site | $6,770,000 |
| Pre-Design Project No. 1AA – 6.5 MG reservoir at Burgess Park site | $10,920,000 |
| Pre-Design Project No. 1BB – 2.0 MG reservoir at Burgess Park site | $7,180,000 |
| Pre-Design Project No. 2 – Inlet/Outlet Structures | $50,000 |
| Pre-Design Project No. 3 – Connecting Zone 3 to Zones 1, 4, and 5 | $8,490,000 |

The order-of-magnitude operations and maintenance (O&M) costs for the pump stations in Pre-design Projects 1A, 1AA, 1B, and 1BB are summarized in Table 1-5. The following assumptions were used:

1). Power costs were estimated at $0.09 per kilowatt-hour.
2). The pumps were replaced after ten years.
3). The pump station (excluding the structure itself) was replaced at 20 years.
4). An interest rate of 4.0% was used.
5). Pump efficiency of 80% and motor efficiency of 90% was assumed.
6). Required personnel was included.

**Table 1-5**
**Summary of Operation and Maintenance for the Preliminary Design Projects**

| Project | Total Cost |
|---|---|
| Pre-Design Project No. 1A – 6.5 MG reservoir at VA Hospital site | $170,000 |
| Pre-Design Project No. 1B – 2.0 MG reservoir at VA Hospital site | $170,000 |
| Pre-Design Project No. 1AA – 6.5 MG reservoir at Burgess Park site | $190,000 |
| Pre-Design Project No. 1BB – 2.0 MG reservoir at Burgess Park site | $190,000 |
| Pre-Design Project No. 2 – Inlet/Outlet Structures | N/A |
| Pre-Design Project No. 3 – Connecting Zone 3 to Zones 1, 4, and 5 | N/A |

## MISCELLANEOUS RECOMMENDATIONS

Other general recommendations to the City that are unrelated to the specific pre-design projects, but that were developed as a result of the modeling study, are as follows:

1). Since maximum day demand information was not available from the City, it is recommended that the City make arrangements to collect source data daily using a SCADA system.

2). It is recommended that the City contact the Insurance Services Office (ISO) to determine the fire flow requirements.

3). A formal agreement with Stanford Linear Accelerator (SLAC) should be completed to allow the pipeline on the SLAC's property to be used by the City for emergency purposes.

4). An agreement with CWC to utilize the raw water in the Bear Gulch Reservoir during emergency conditions should be pursued.

5). Further investigations to using existing or new groundwater wells for an additional supply of emergency water should be pursued.